Recycling at the MRF

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Waste Management Recycling Service

January 2011

Agenda

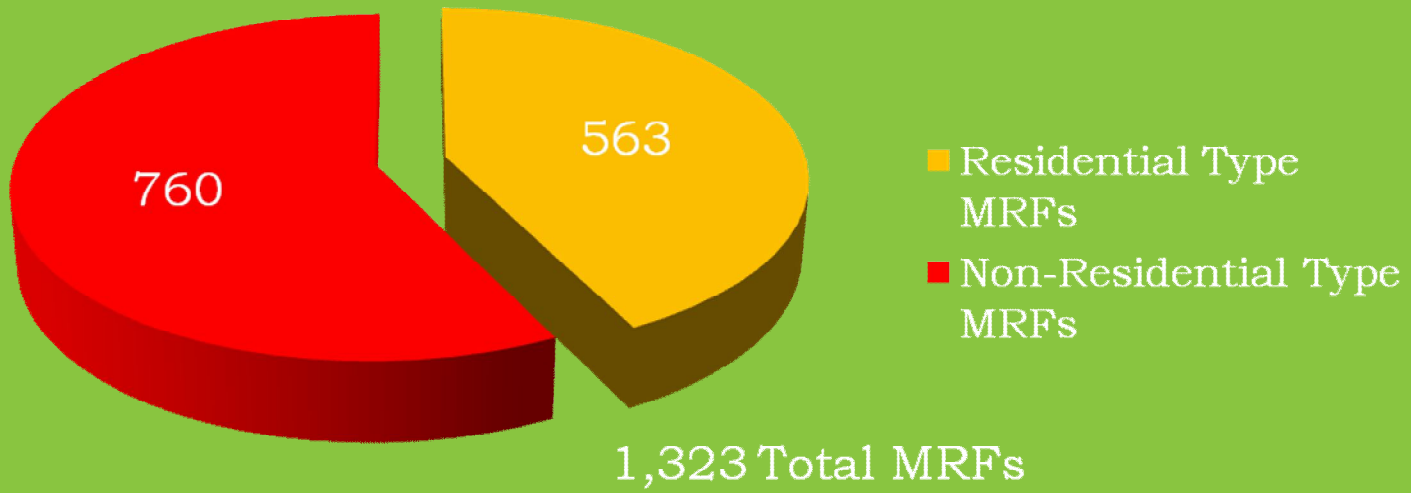
- Current State of MRFs
  - How Many?
    - Who Owns Them?
    - Service Areas Covered?
  - What is being Collected / Separated?
    - Plastics – Bottles Only vs All
    - Glass – Included or not
    - Newspaper only vs All paper, etc.
    - Current Technology Spread (Hand, automated, Optical)
- What is on the Technology Horizon?
    - Currently available, but not widely used and why?
    - How improve use of technology
- Summary
    - Opportunities currently missing
    - Barriers to recycling more packaging
    - Additional issues

Acknowledgements

"Berenyi, Eileen Brettler. Materials Recycling And Processing In The United States: 2007-2008
Yearbook And Directory (Westport, CT: Governmental Advisory Associates, Inc.) ©2007.

How Many MRFs are There and Who Owns Them?

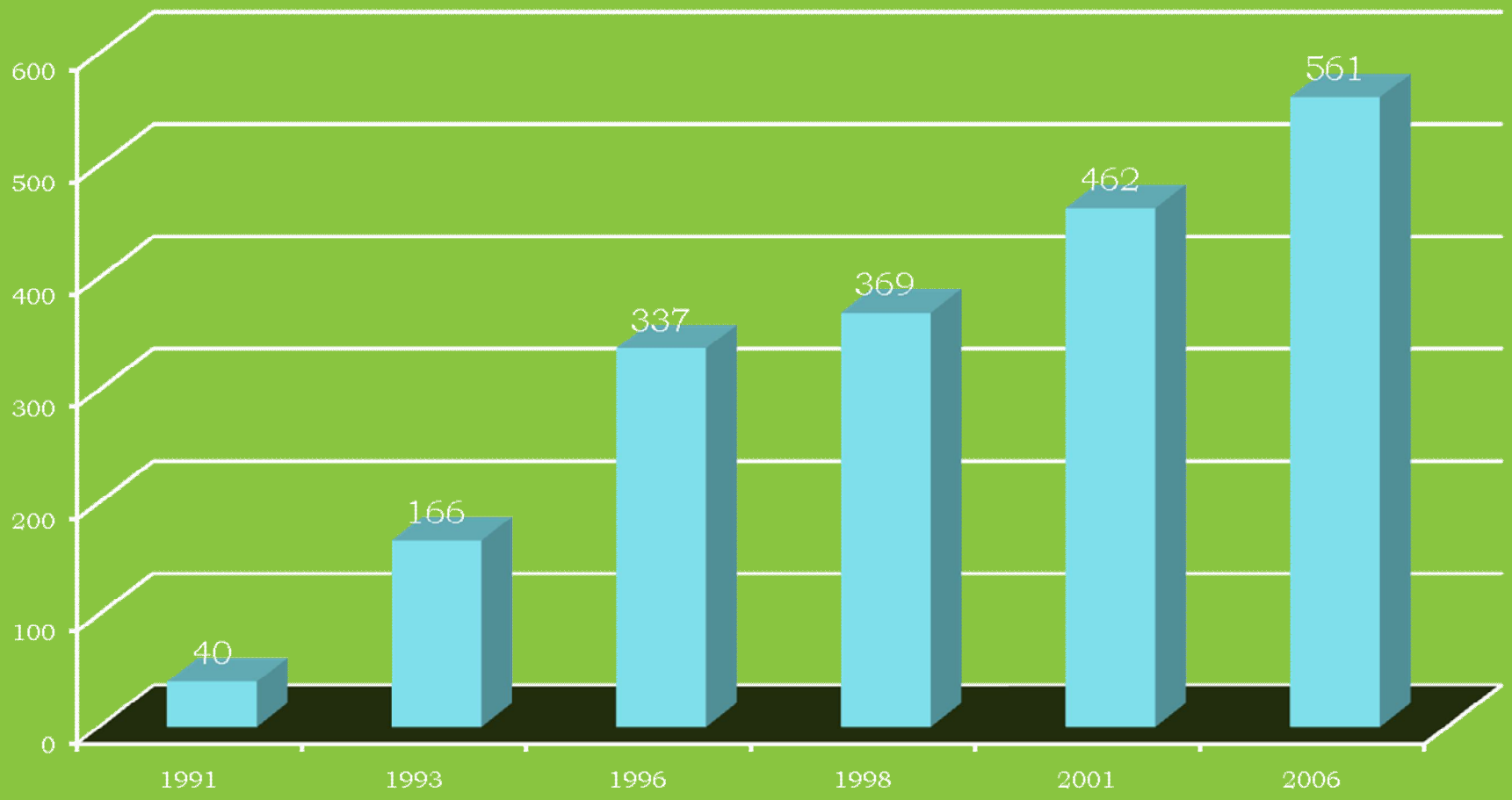
Total MRF's



1,323 Total MRFs

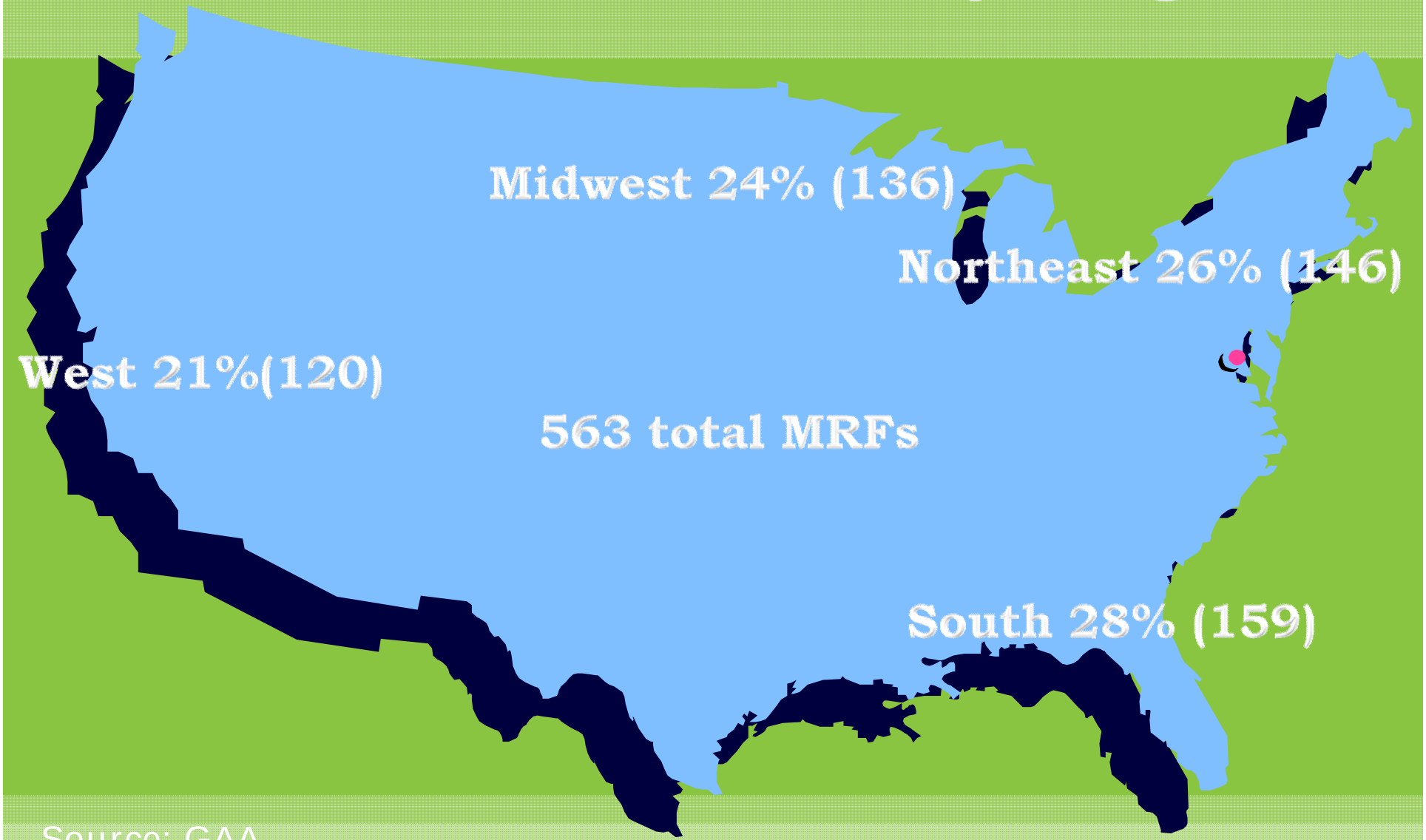
Sources: Governmental Advisory Associates and Waste Business Journal

Growth in Plants 1991 - 2006



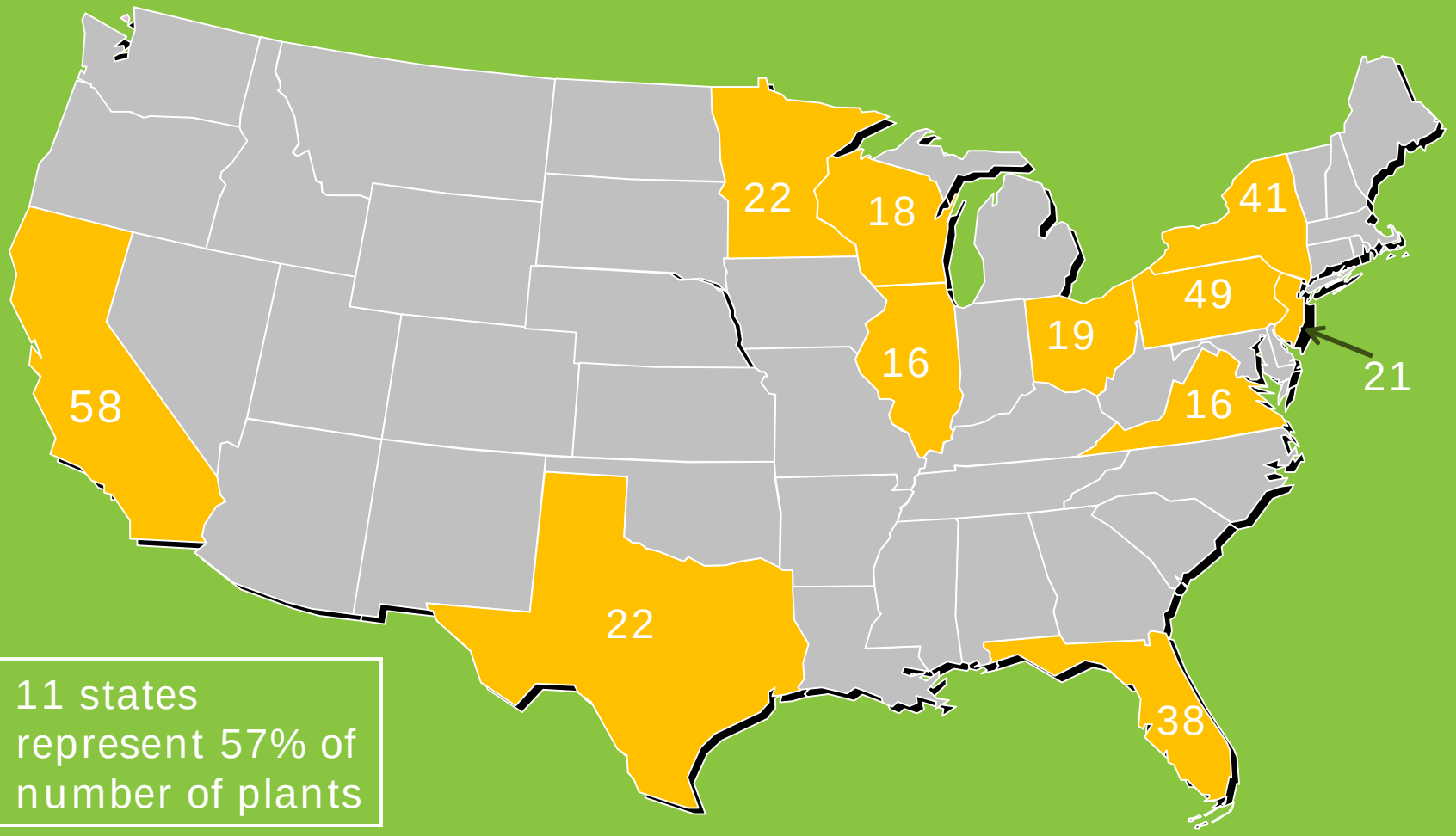
Source: GAA

MRF Distribution by Region



Source: GAA

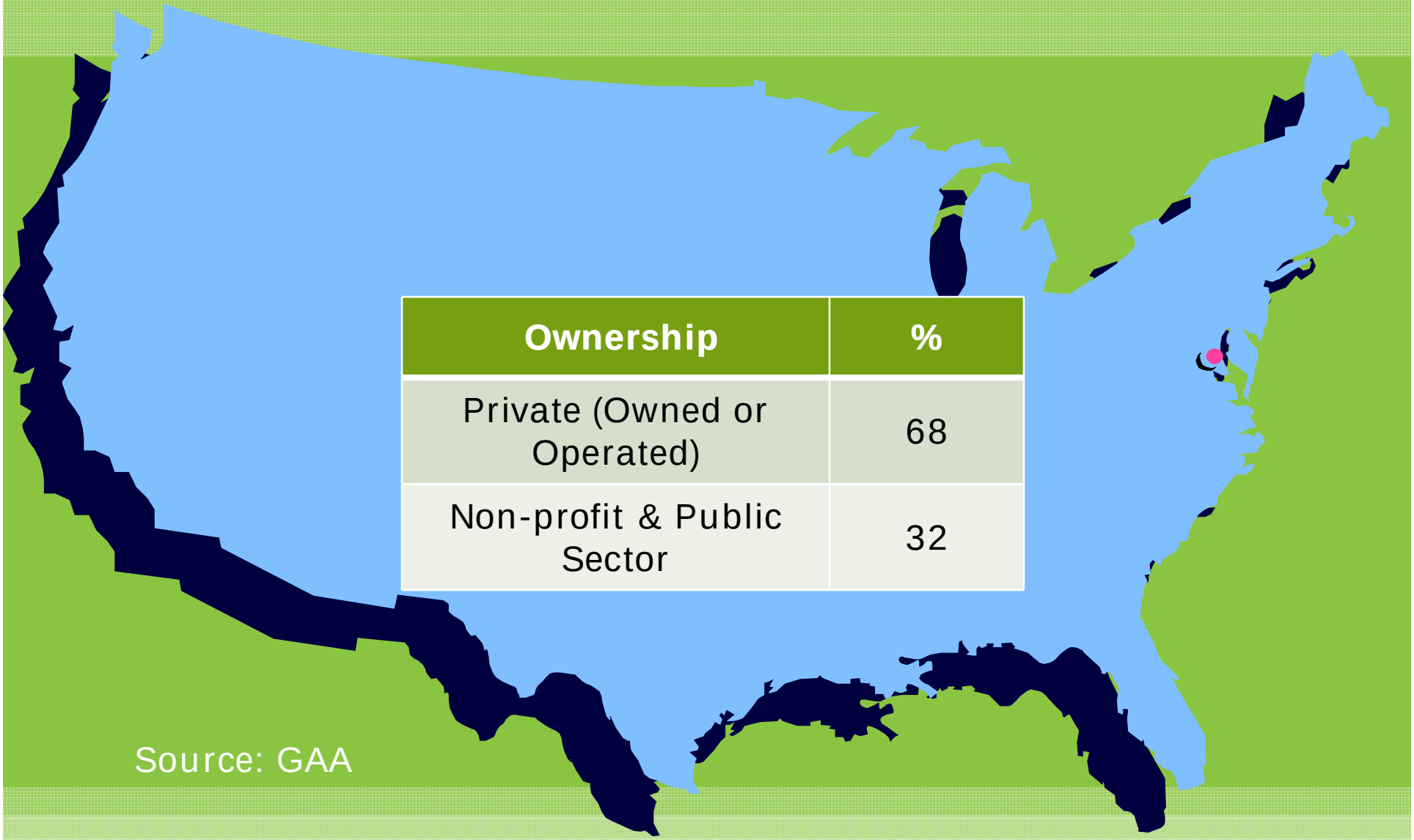
States with the most plants



11 states represent 57% of number of plants

Source: GAA

Ownership of MRFs

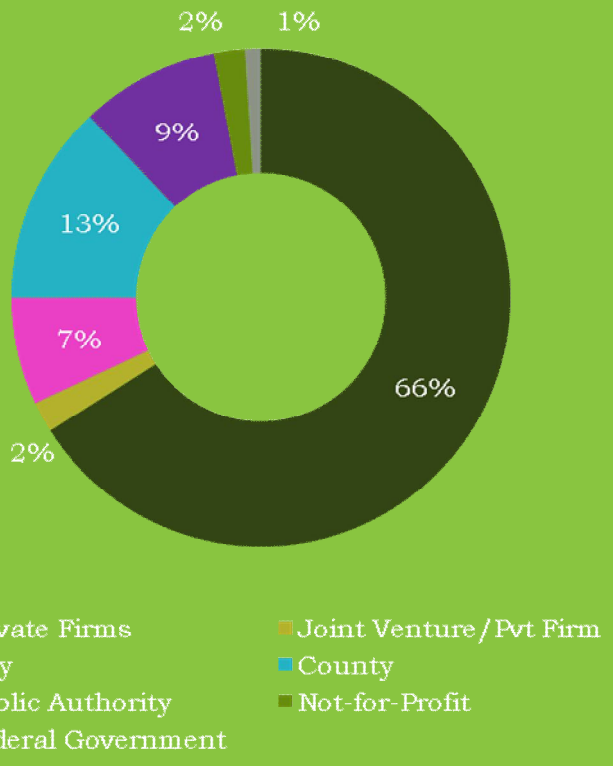


Ownership	%
Private (Owned or Operated)	68
Non-profit & Public Sector	32

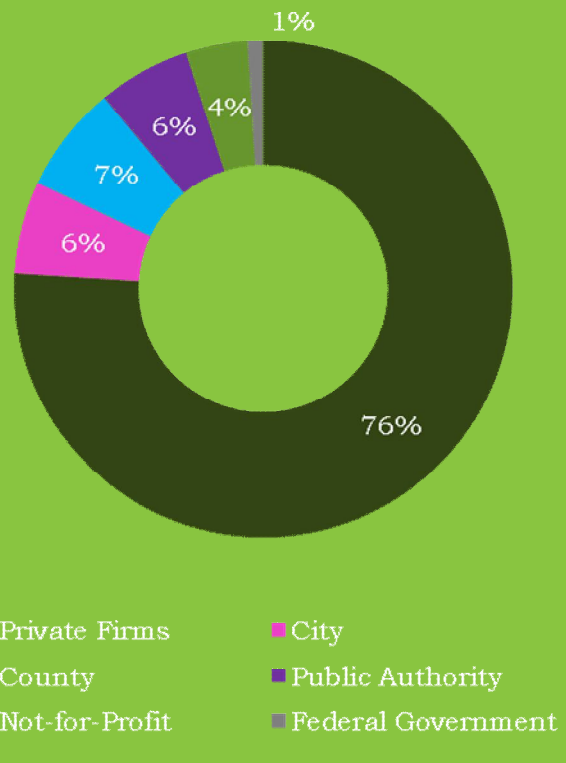
Source: GAA

MRF Owners and Operators

Owners



Operators



Source: GAA

MS by Operator - Tons/Day

	Operator	TPD	Percent
1	Waste Management	19,023	23.0%
2	Republic	7,774	9.4%
3	Casella	3,935	4.8%
4	Smurfit-Stone	3,404	4.1%
5	SP Recycling	2,706	3.3%
6	Resource Management	2,650	3.2%
7	International Paper	1,825	2.2%
8	Greenstar	1,580	1.8%
9	City Carton	1,250	1.5%
10	Far West Fibers	1,075	1.1%
	Total Top Ten	45,222	54.4%
	Other Private Sector	34,358	41.6%
	Public Sector	4,688	5.6%

Source: GAA, WM, Waste Business Journal

Market Share by MRF Operator

	Operator	Plants	Percent
1	Waste Management	95	16.8%
2	Republic	40	7.1%
3	Casella	24	4.3%
4	SP Recycling	14	2.5%
5	Greenstar (2010)	13	2.2%
6	Smurfit-Stone	12	2.1%
7	International Paper	8	1.4%
8	Western Recycling	7	1.2%
9	Hudson Baylor	6	1.1%
10	Rumpke	6	1.1%
	Total Top Ten	225	39.8%
	Other Private Sector	235	41.6%
	Public Sector	112	19.8%

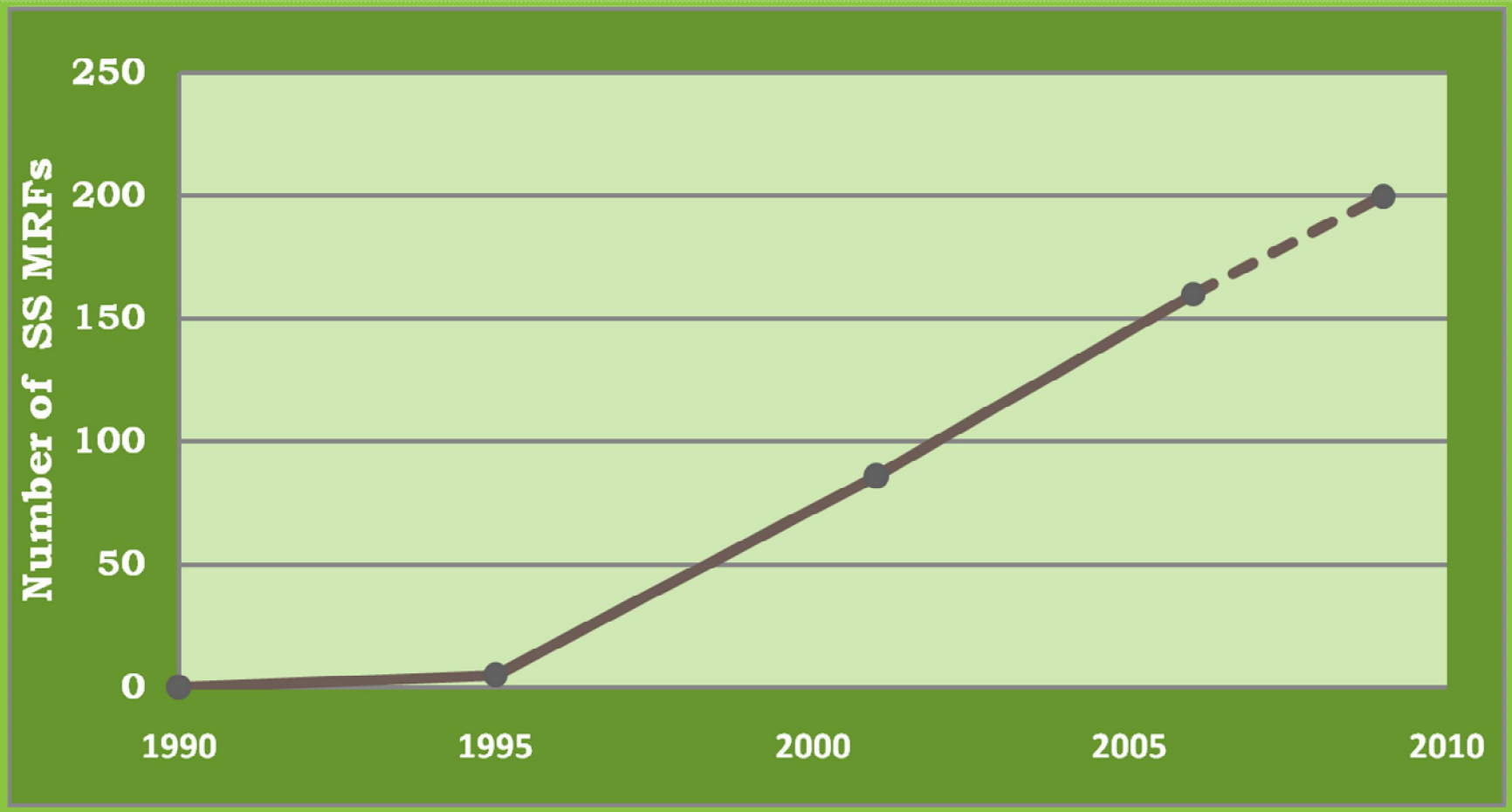
Source: GAA, WM, Waste Business Journal

Highlight of Study

	TPM	Cost/Ton
PUBLIC	2,731	$ 83.56
PRIVATE	4,777	$ 44.56
WM RECYCLE AMERICA	7,819	$ 43.17

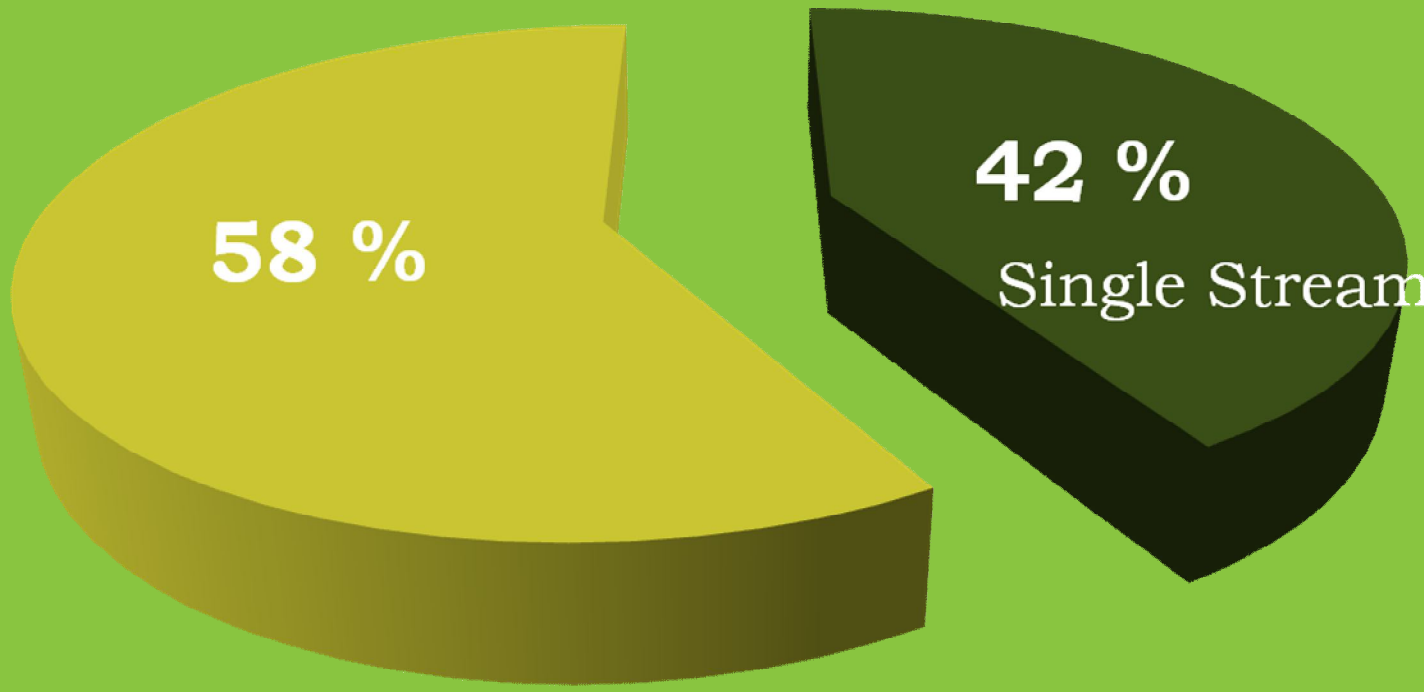
Source: Moore & Associates

Increase in number of SS MRFs since 1990



Source: GAA and Columbia University

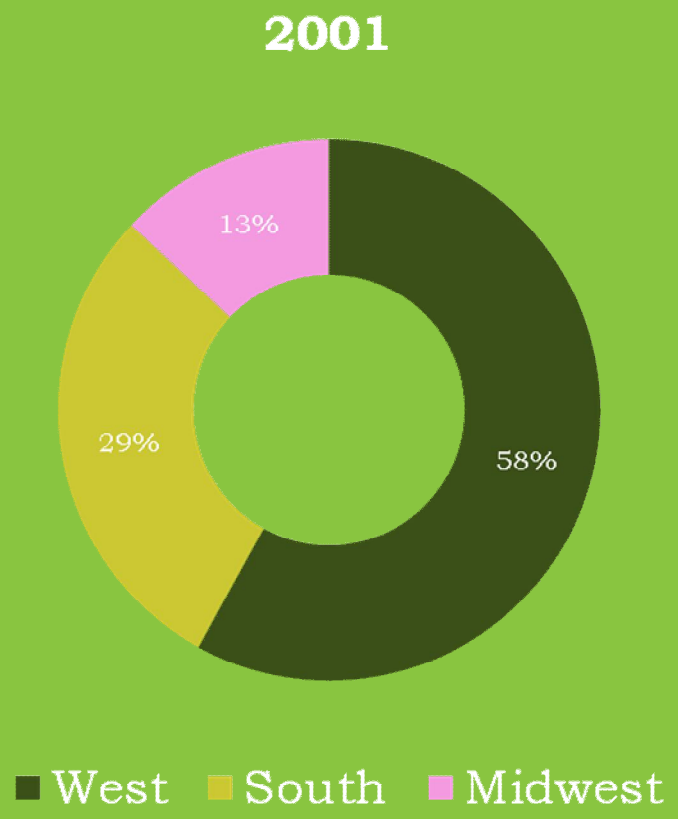
SS versus other MRFs

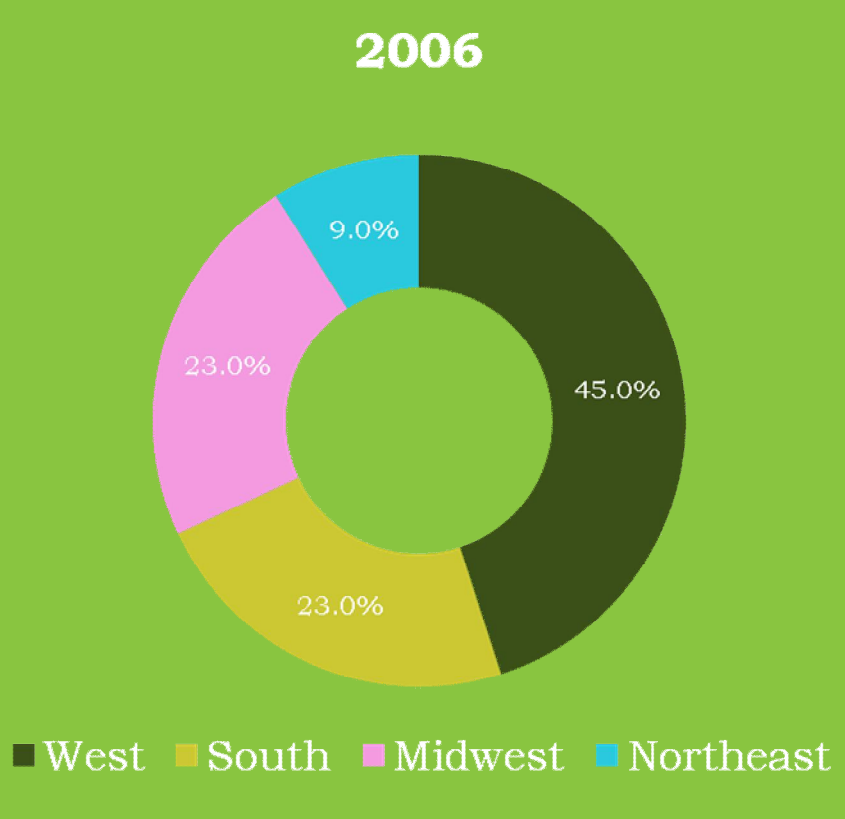


22.1 Million Tons of Total MRF Capacity

Source: GAA & Columbia University

Single Stream by Region



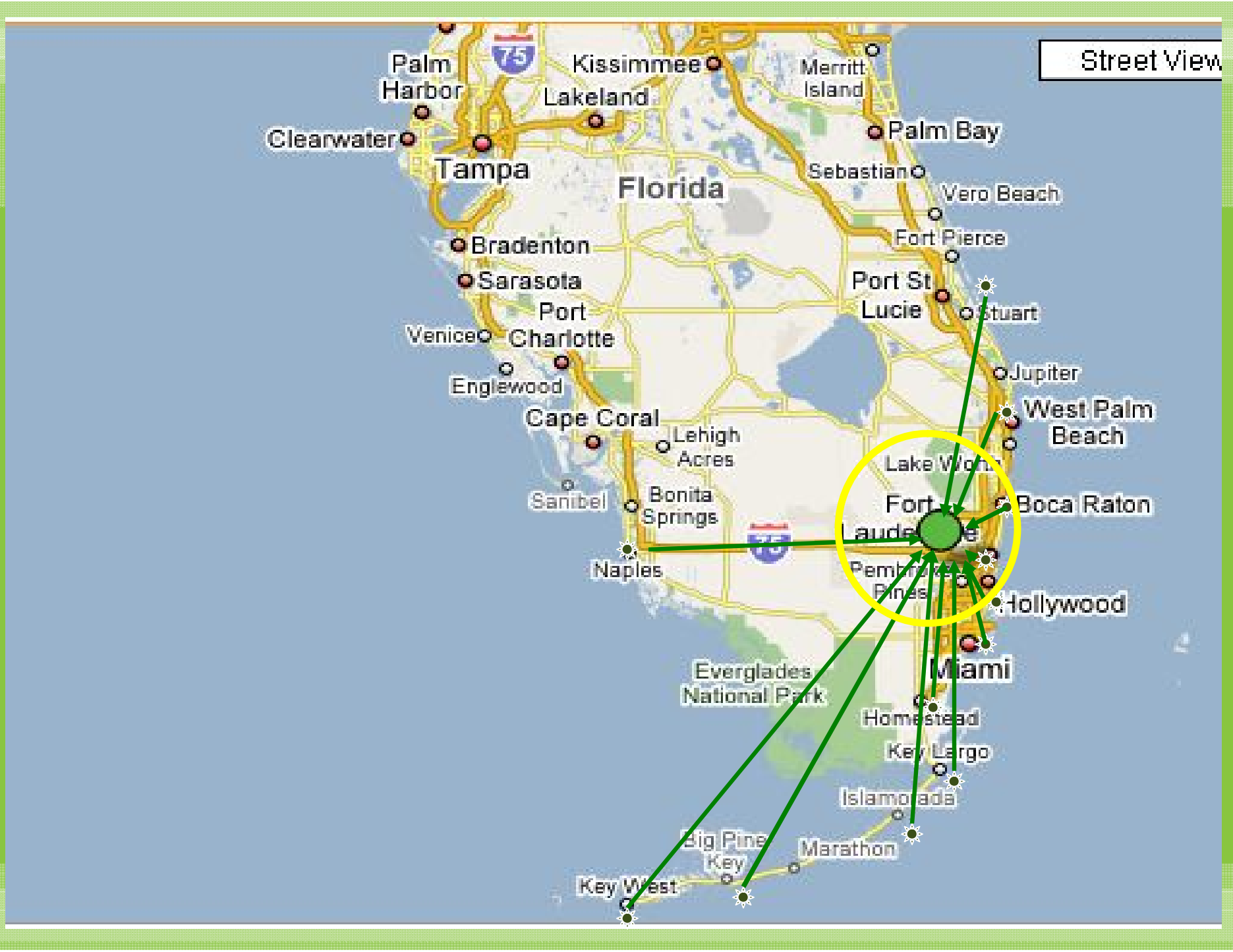


Source: GAA

Equipment Capital costs of SS and DS MRFs

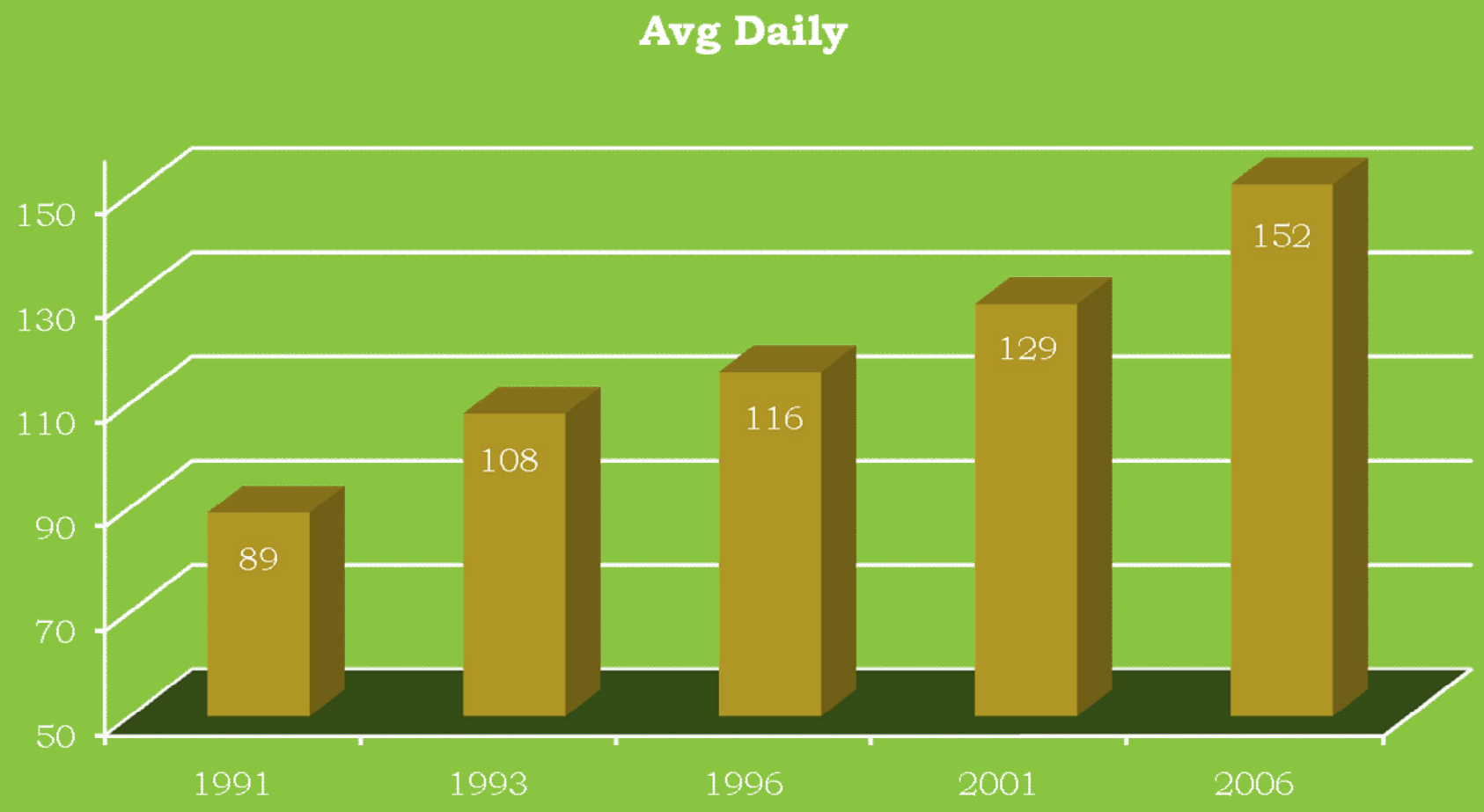
MRF	Average MRF Capacity (tons/day)	Average Equipment Capital Cost	Capitol
DS MRFs	152	$4,907,000	$105,690
SS MRFs	206	$7,551,000	$66,630

Source: GAA & Columbia University


Street View
Palm Harbor
Kissimmee
Merritt Island
Lakeland
Clearwater
Palm Bay
Tampa
Florida
Sebastian
Vero Beach
Fort Pierce
Bradenton
Sarasota
Port St Lucie
Stuart
Port Charlotte
Venice
Englewood
Jupiter
West Palm Beach
Cape Coral
Lehigh Acres
Lake Worth
Sanibel
Bonita Springs
Fort Lauderdale
Boca Raton
Naples
Pembroke Pines
Hollywood
Miami
Everglades National Park
Homestead
Key Largo
Islamorada
Big Pine Key
Marathon
Key West

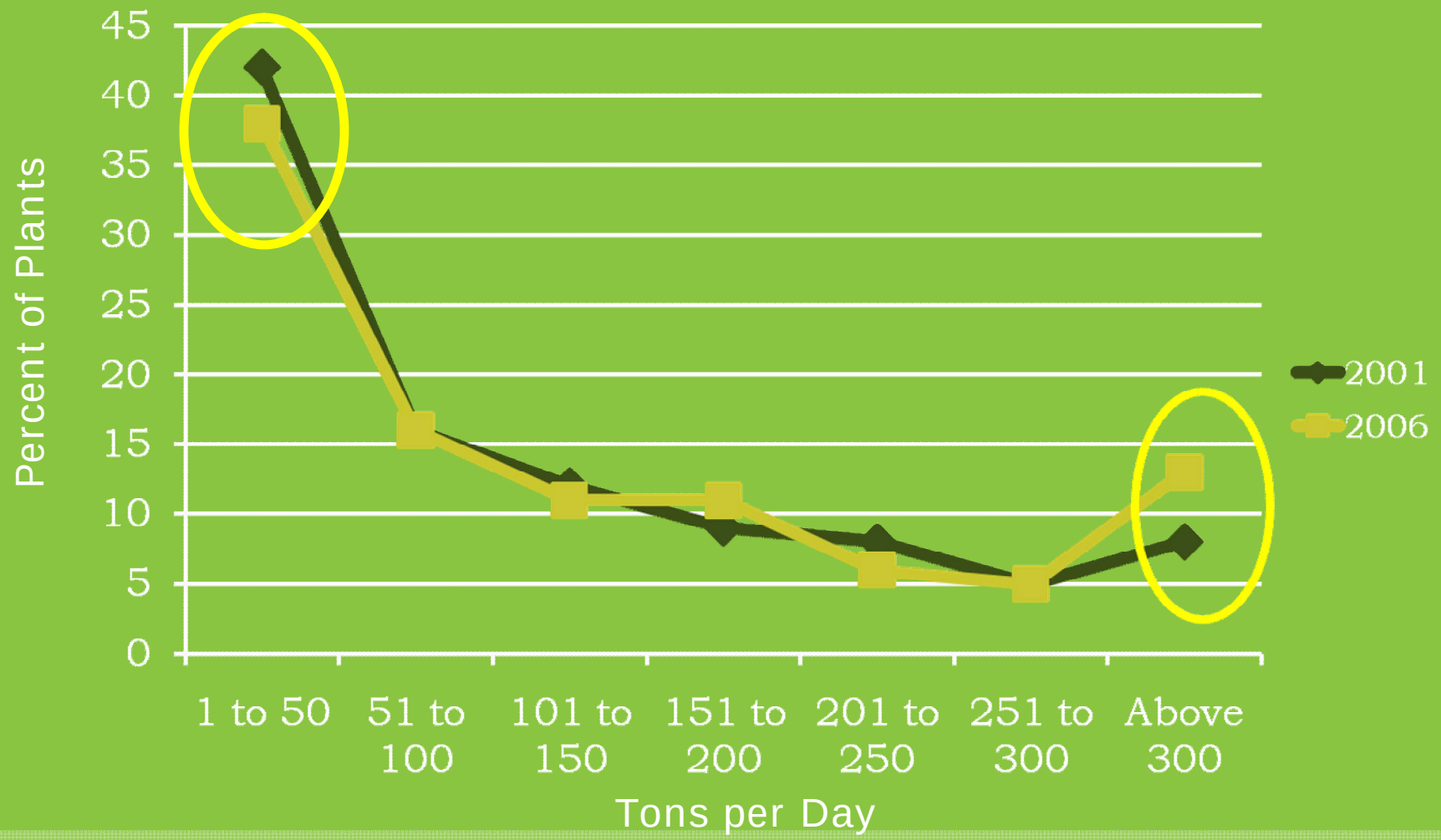
What is Being Collected/Separated

Tons Processed per Day

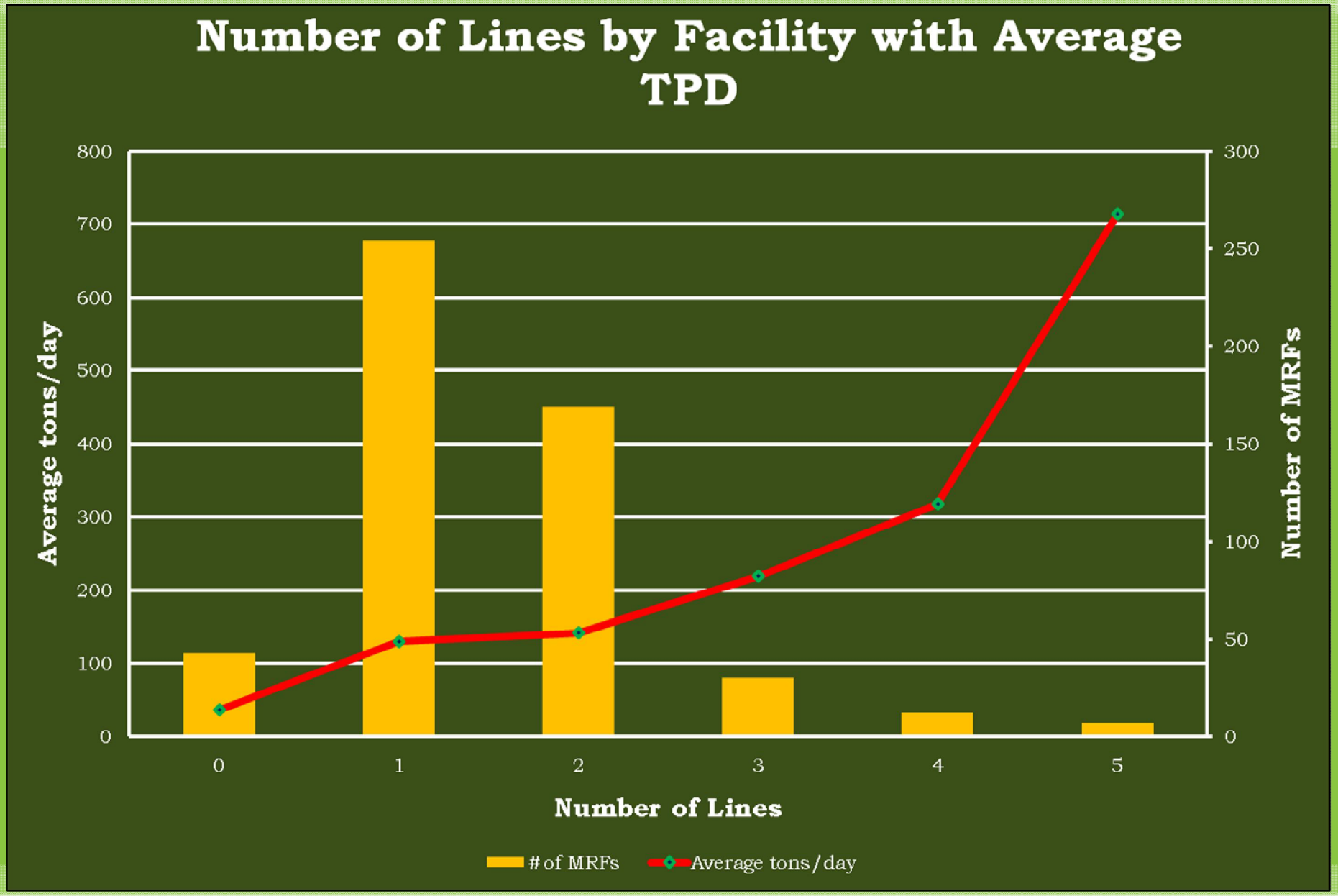


Source: GAA

Tons per Day 2001 and 2006

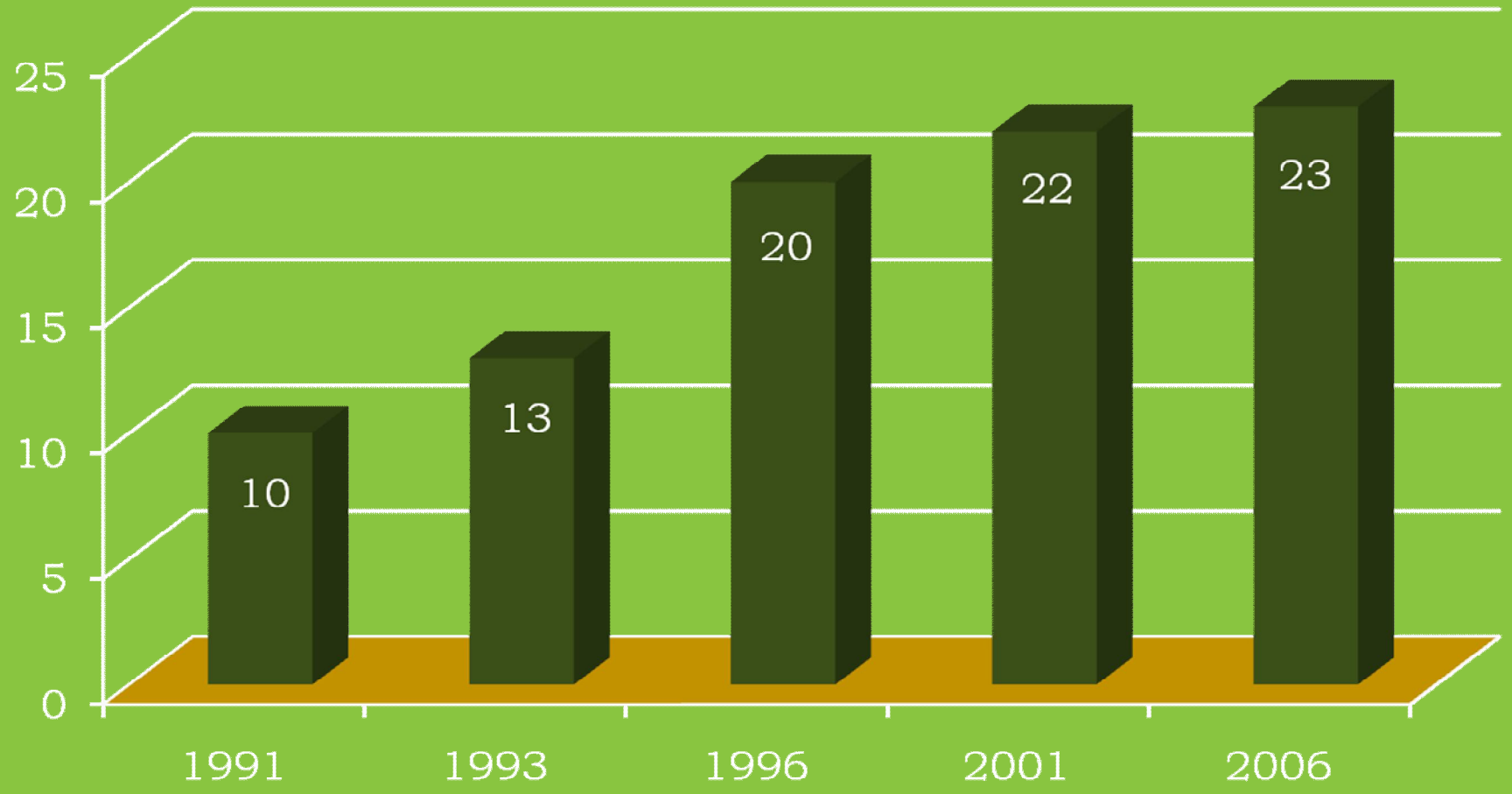


Source: GAA


Number of Lines by Facility with Average TPD
Average tons/day
Number of MRFs
800
700
600
500
400
300
200
100
0
300
250
200
150
100
50
0
0
1
2
3
4
5
Number of Lines
# of MRFs
Average tons/day

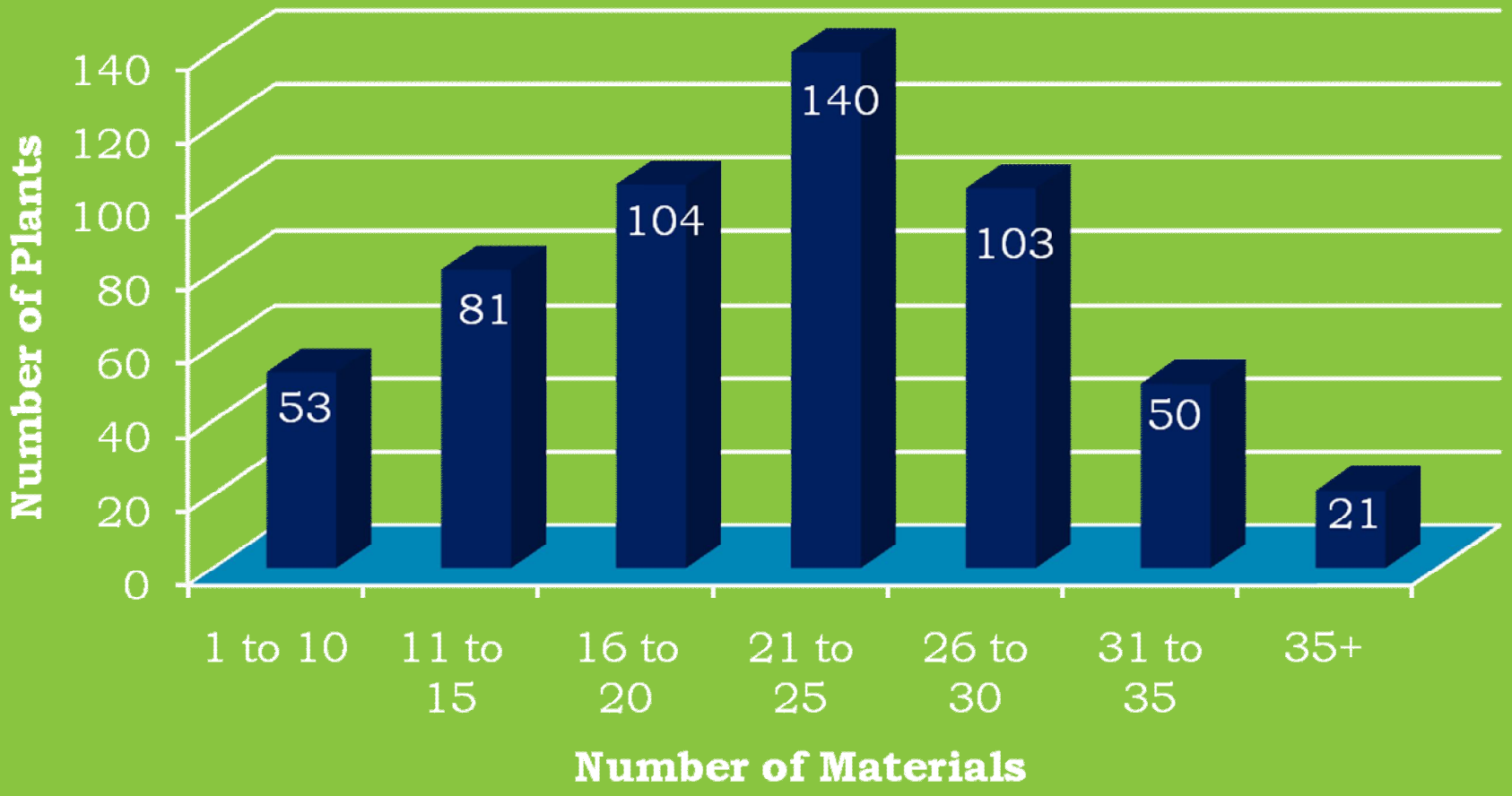
Source: GAA

Average Number of Materials Processed



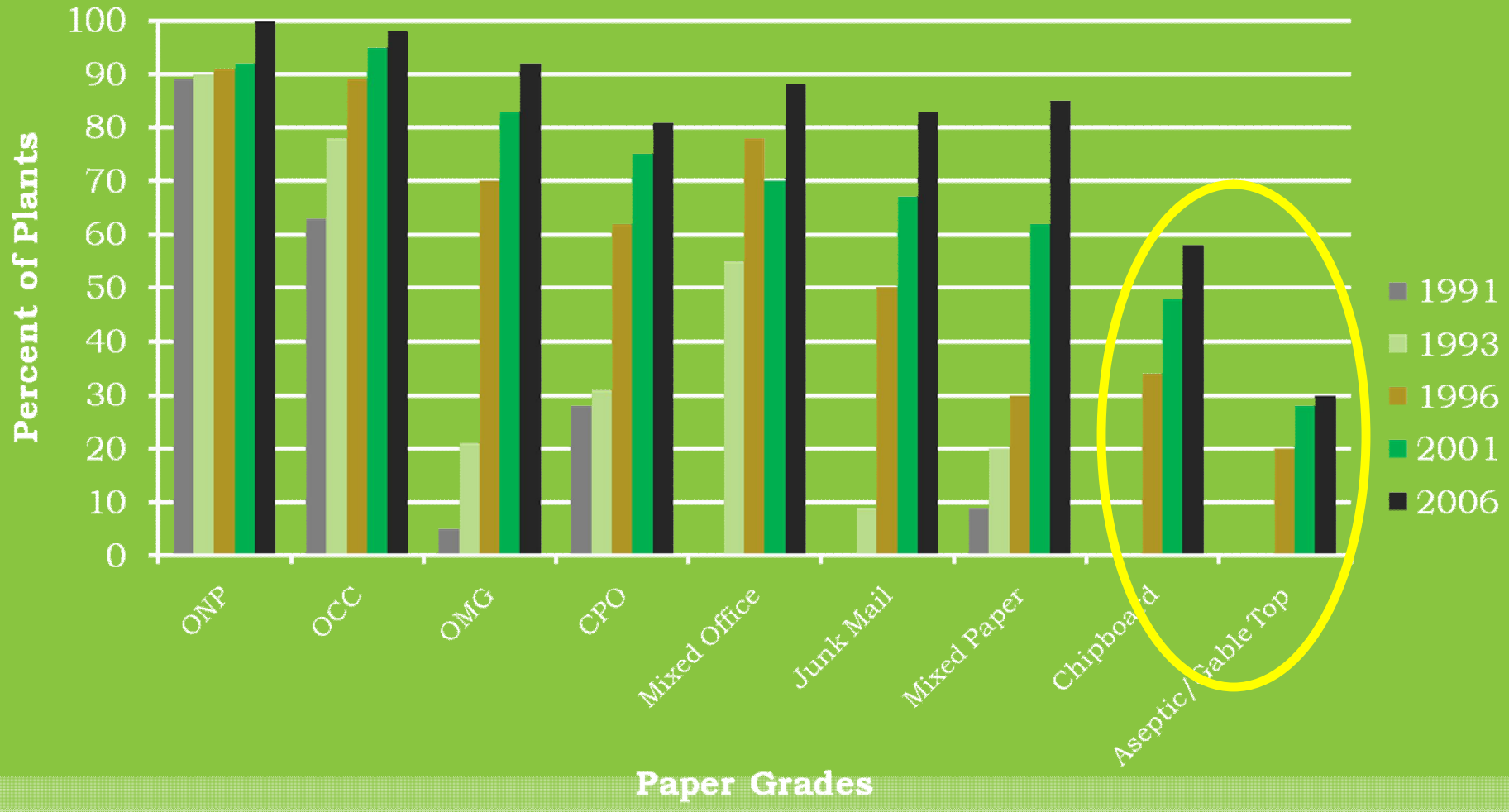
Source: GAA

Number of Materials Processed by MRFs



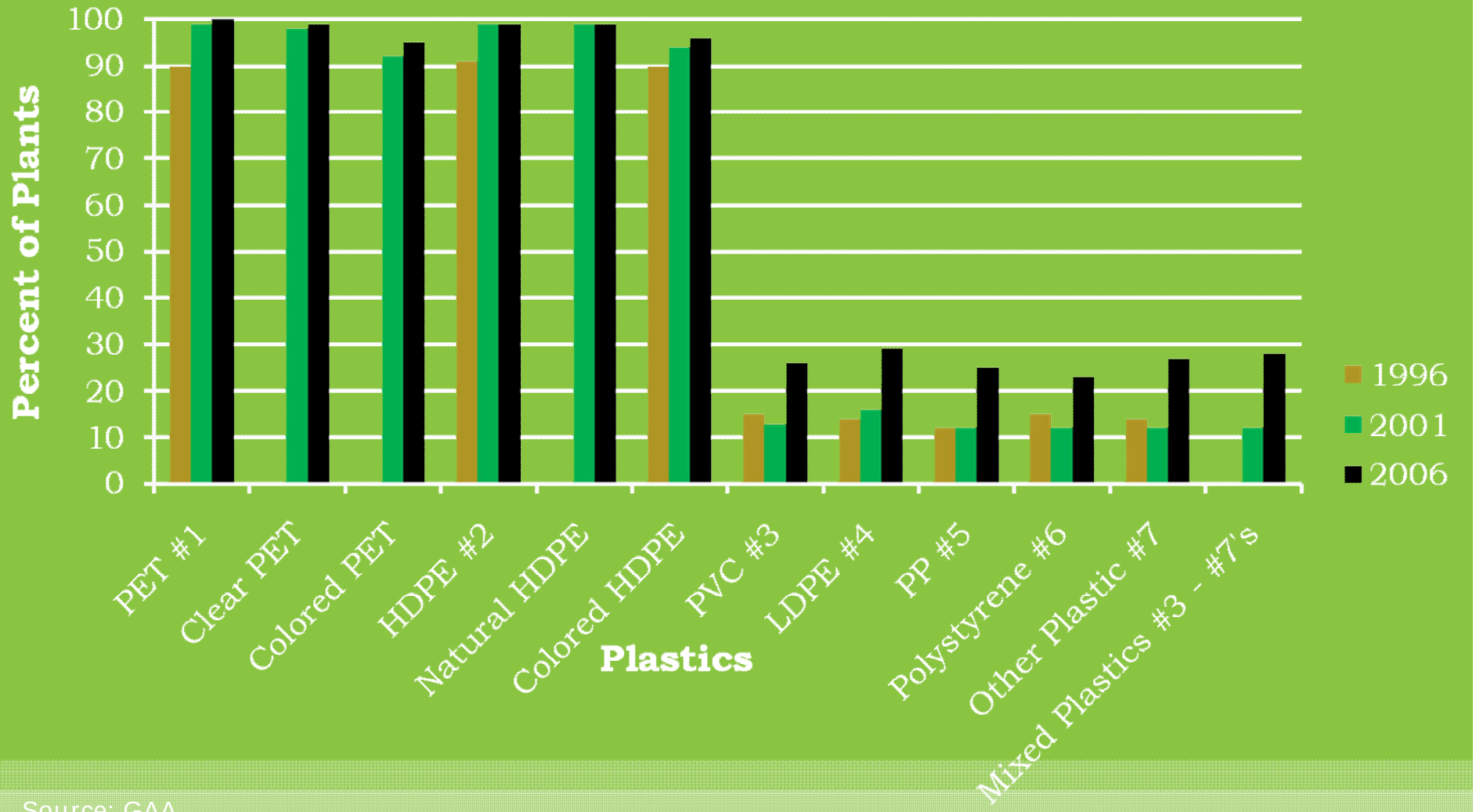
Source: GAA

Percent of Plants Recovering Various Paper Grades



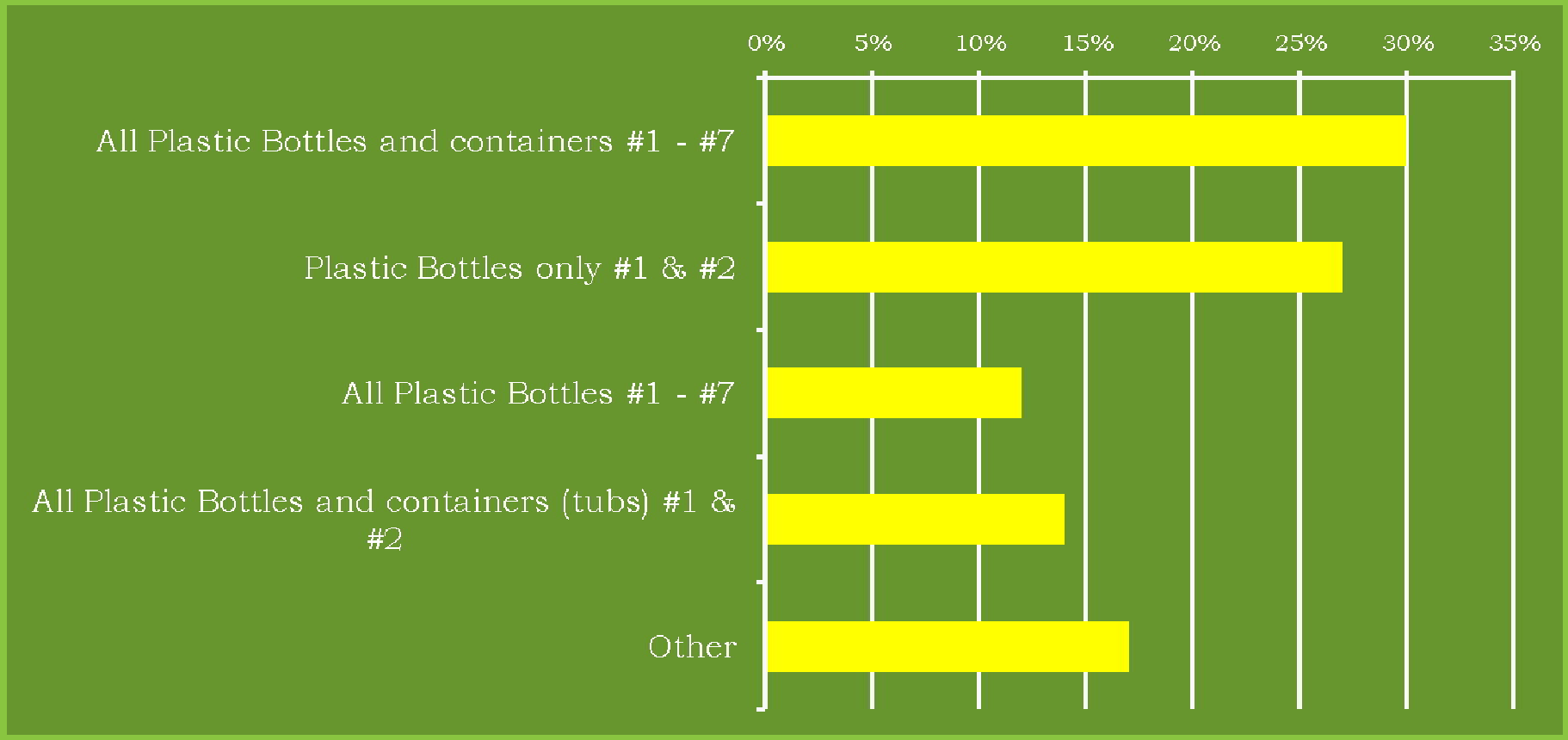
Source: GAA

Plastic Recovery in MRFs 1996 - 2006



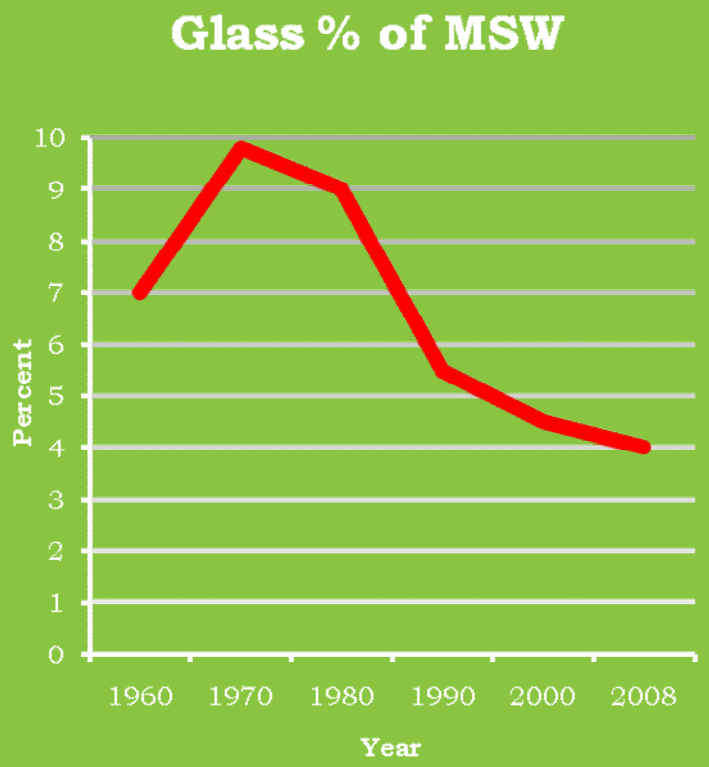
Source: GAA

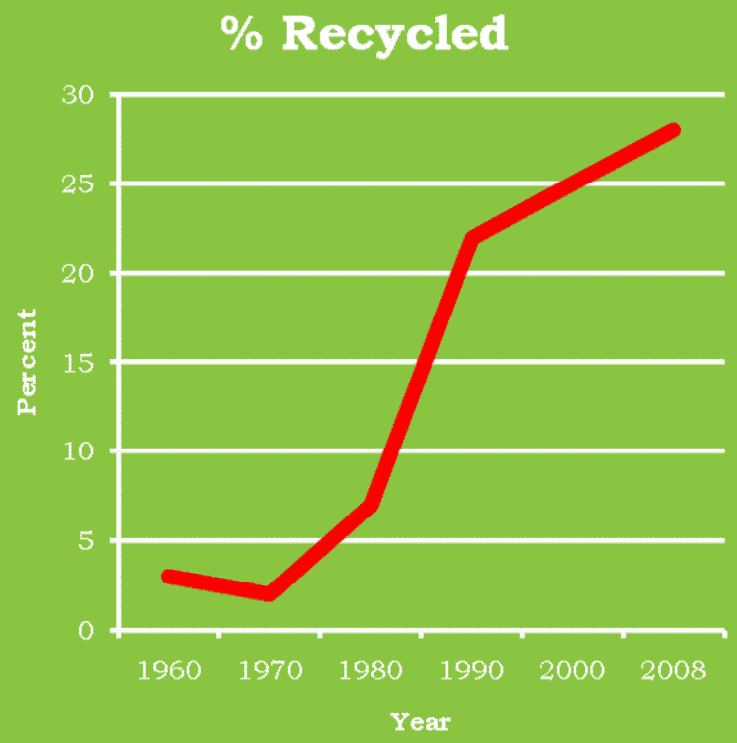
What Plastics are being recycled?



Source: NYC Dept of Sanitation

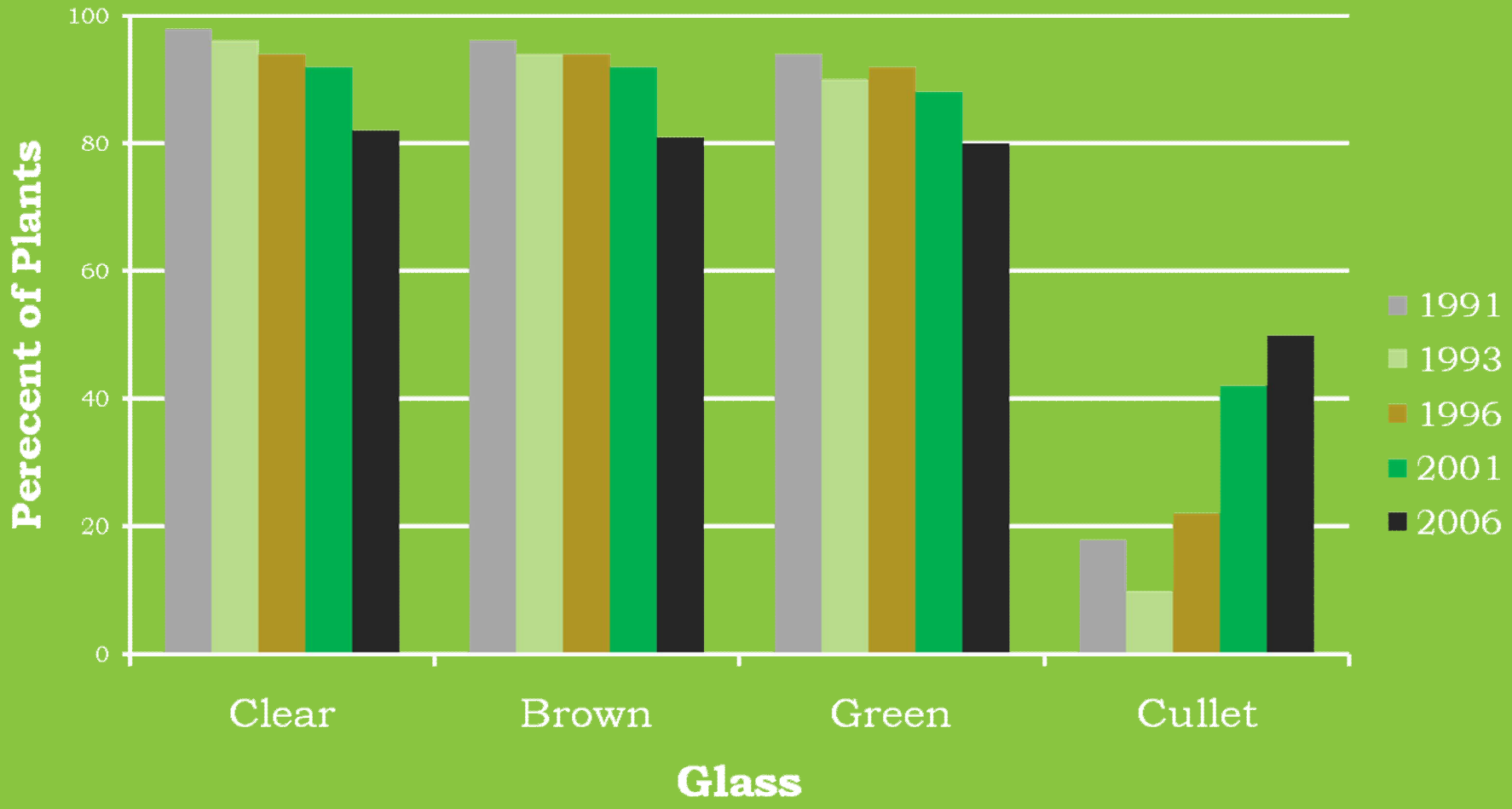
Glass Containers MSW & Recycled





Source: WasteAge.com

Glass Recycling Trends



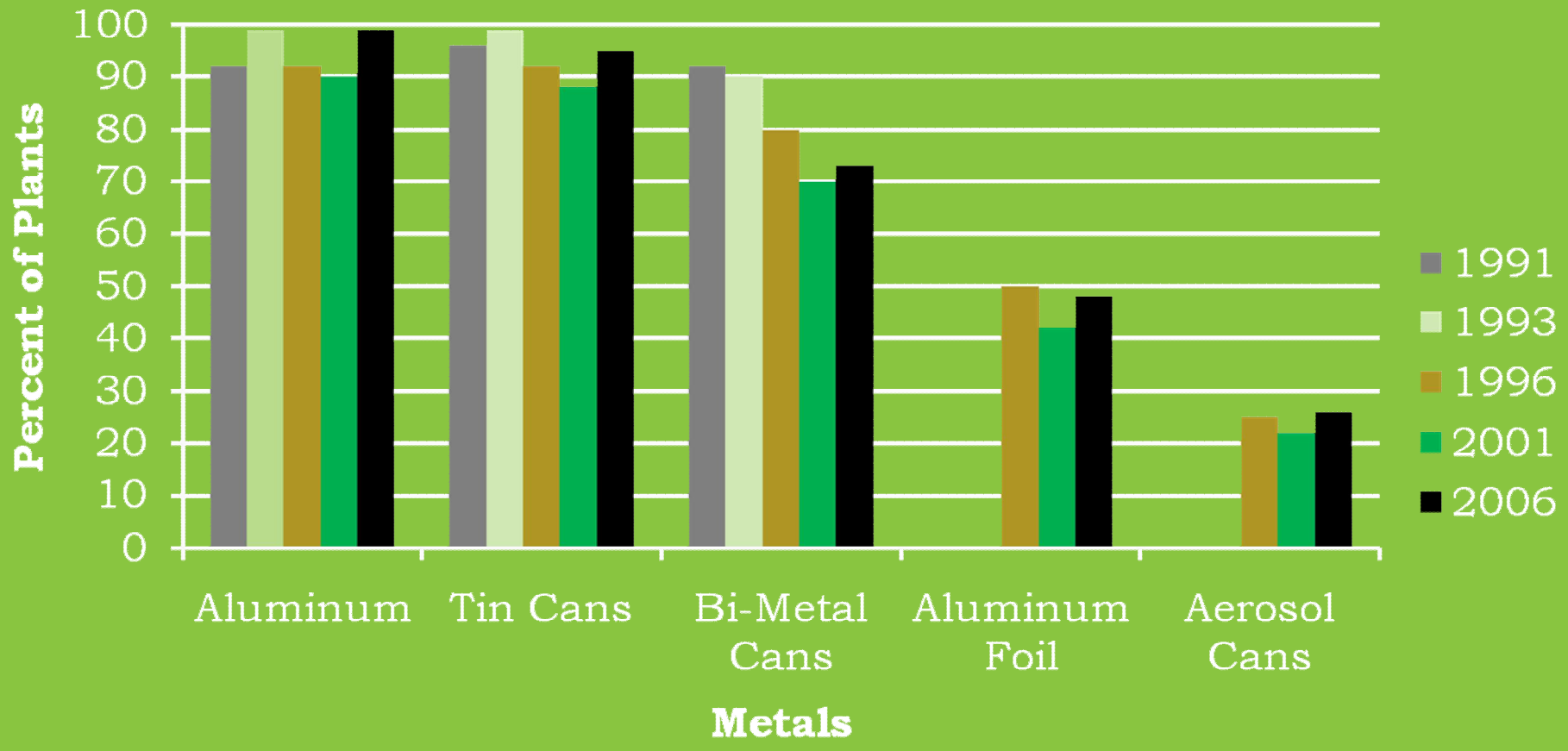
Source: GAA

Glass Recycling

- Recent resurgence in demand for glass cullet – Supply is becoming issue
  - Fiberglass industry
  - Bottle industry
- 5 Years ago Strategic Materials had zero Optical Sorters, today they have over 100.
- Planning on 5 new plants in 2011 all that include optical sorting.

Source: GAA

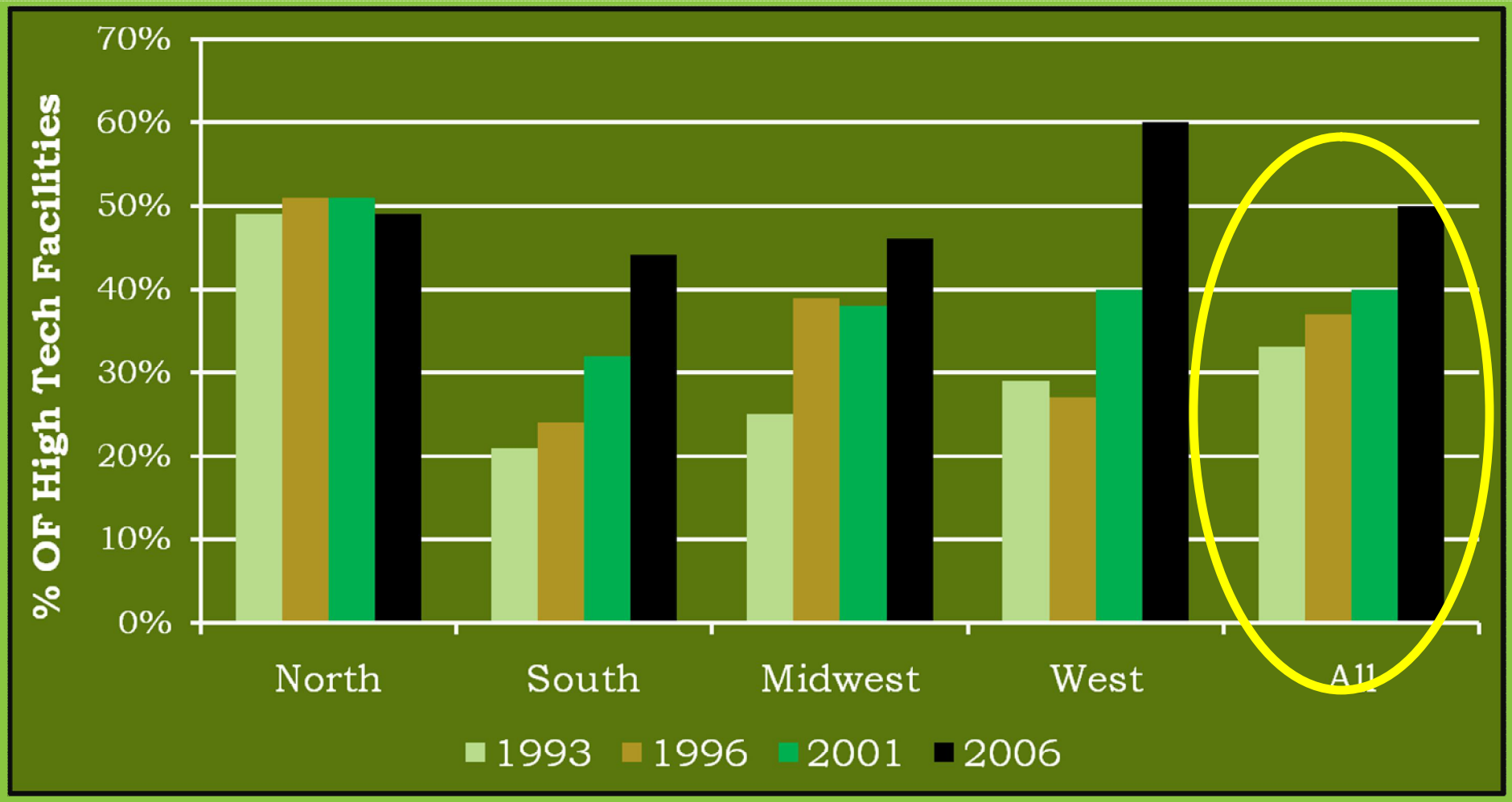
Metals Recovery at MRFs 1991-2006



Source: GAA

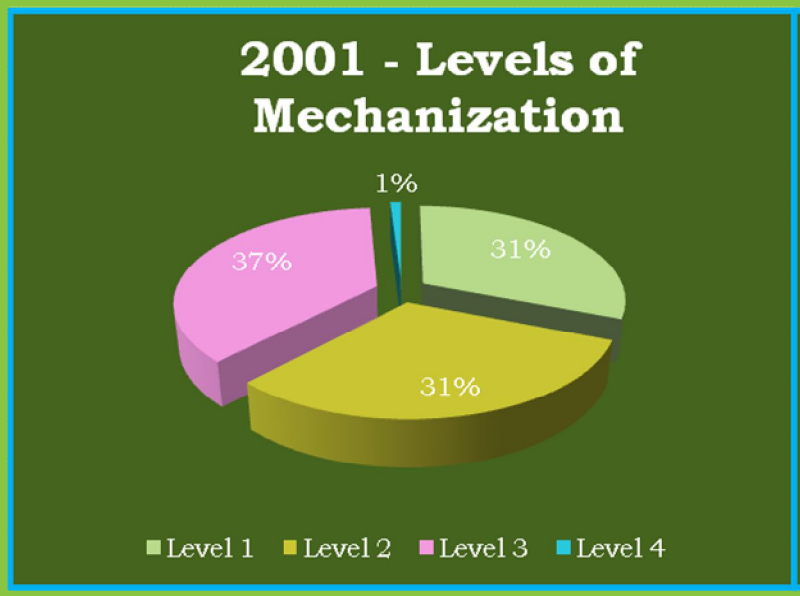
What is on the Technology Horizon?

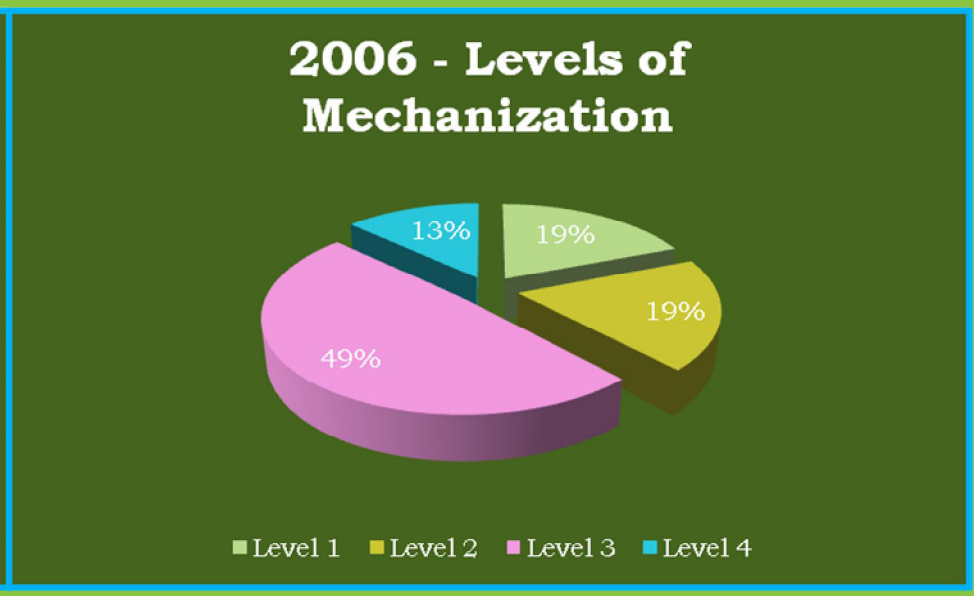
% Hi-Tech MRFs by Region



Source: GAA

Levels of Mechanization in SS Plants





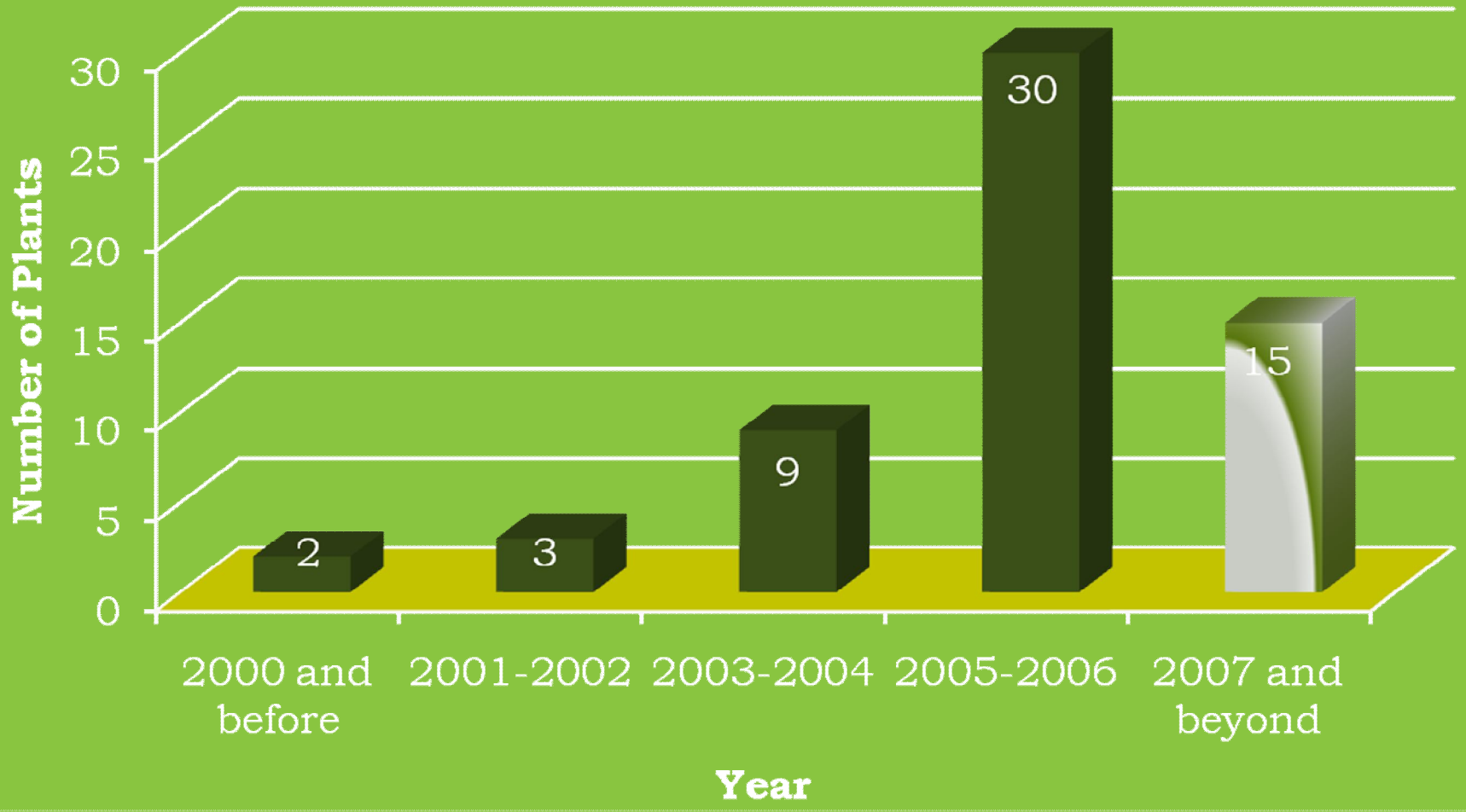
Source: GAA

Technology used to separate PET

Technology	Description	Key Players
Near-Infrared (NIR) 	• Sensor uses an infrared beam to identify the plastic type by recognizing a light intensity reading unique to each polymer	Titech, Pellenc, MSS, NRT, RTT, S+S, Rofin, Eveready, Buhler, EagleVizion
Laser 	• Referring to an impurity's spectrum, i.e. its physical "fingerprint," is able to detect and separate it from the product flow	Unisensor, Best
X-Ray 	• Distinguishes waste based on density • Useful for detecting additives • Two types: x-ray and x-ray fluorescence	NRT, Binder+Co, Best
Color Sorting 	• Separates shades of color seen by the human eye for mixed bottles or flake • Use vision technology (cameras) or spectroscopy	Titech, Pellenc, MSS, NRT, RTT, S+S, Rofin, Eveready, Buhler, EagleVizion, Satake, Best
Density Separation 	• Flakes sink or float based on relative density to a fluid • Different fluids in succession to separate many materials • New waterless technology using air	Eurohansa, TLT Turbo Lamiare Treantechnik, John Brown Machines, Sorema

Source: Waste Management

Installation of Optical Sorters by Year in SS Plants



Source: GAA

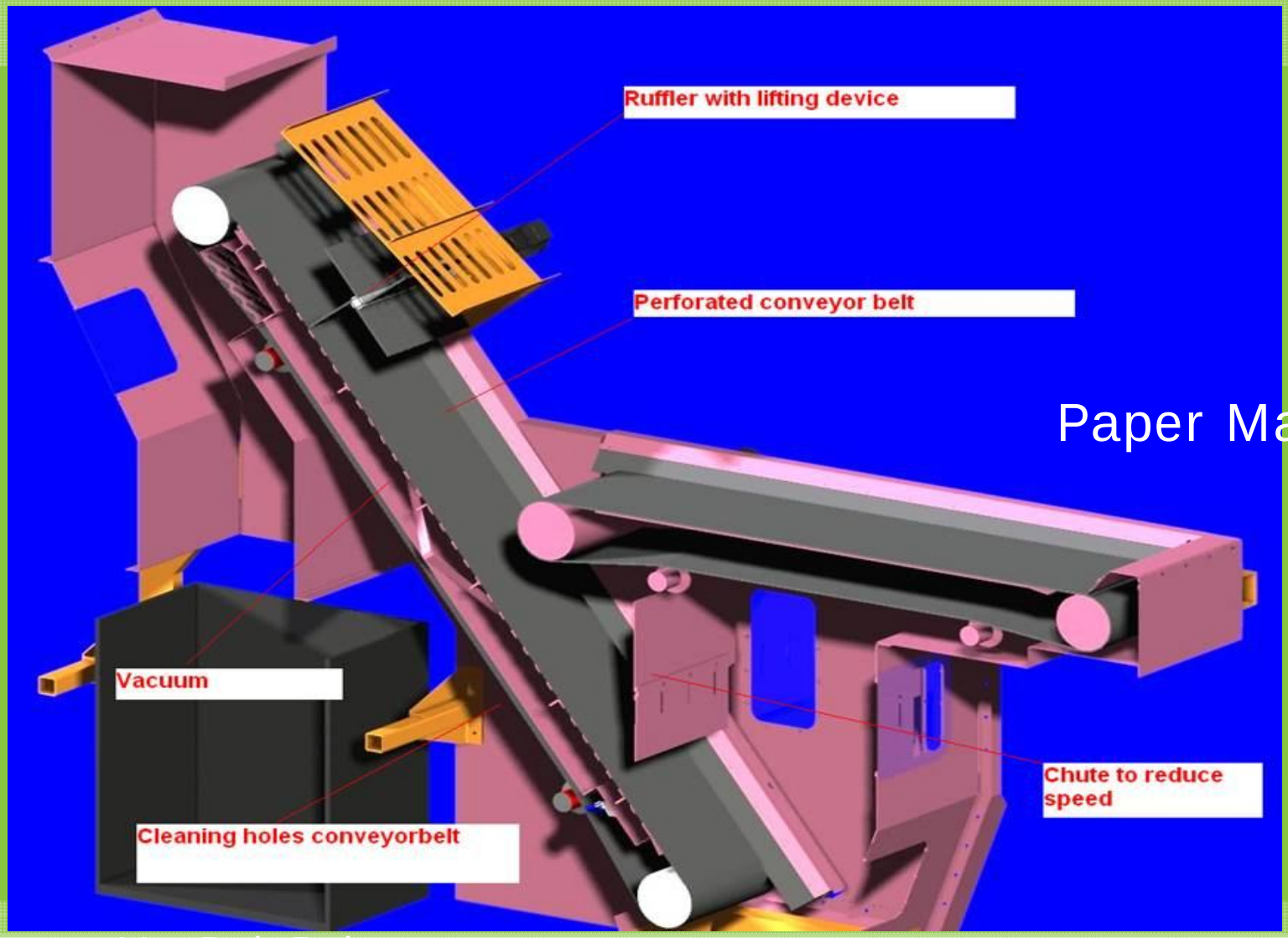
What is on the Technology Horizon?

New Technologies being deployed

PAPER SPIKE

Source: VanDyk Baler

New Technologies being deployed



Paper Magnet

Source: VanDyk Baler

Summary

Opportunities missing
Barriers to recycling more packaging
Additional issues

Summary

- Summary
  - MRFs are becoming more complex and to a great extent less flexible
- Barriers to recycling more packaging
  - Efficiency and cost
  - Outlying material types with not enough volume or markets
- Additional Issues
  - Increased amount of Lead in Glass in recent years

Questions?

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